Name_____ Period _____Date_____

Partners Names _____

Testing Reaction Time

Introduction

Objects in free fall near the Earth's surface act under the influence of gravity. The velocity of falling objects near the Earth's surface changes at a rate of 9.8m/s2. You can use this information and the distance that an object falls to find the time that an object is in free fall.

Human reaction time depends on many factors, such as the time a signal takes to go from your eyes to your brain the time your brain takes to process the signal, and the time your brain takes to signal a reaction. You will measure the distance that a meterstick falls and then use an equation based on free-fall to determine the amount of time the meterstick took to fall. You will also measure the amount of time the meterstick falls by using a stopwatch and will compare the measured reaction time with the calculated reaction time.

Procedure

1. Work in groups of three. Record your partners' names at the top of the lab sheet. Have one of your partners stand on a chair and hold a meterstick vertically with the zero end down. Have your other partner record the data on your lab sheet. Hold your fingers about one and a half inches lined up with the bottom of the meterstick.
2. Have your partner drop the meterstick. Try to catch the meterstick between your thumb and forefinger as quickly as possible. Once you catch the meterstick, your other partner should read where you grabbed the meterstick and record the information in the data table in meters.
3. Repeat steps 1-2 nine more times for a total of 10 trials. Record all ten trials in the data table.

Data – 1

Distance Data	
Trial #	**Distance (m)**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Average Distance (D1+D2…+D10)/10	
Reaction Time	

Analysis

1. Find the average distance for your data by adding all ten trials together and dividing that answer by ten. Record the average distance in the data table in meters.
2. To find the reaction time, use the following formula and record it in the data table in seconds.

Reaction Time (s) = $\sqrt{\frac{2\ x\ average\ distance}{9.8\ m/s^2}}$

Procedure Part 2

Repeat steps 1-2 again, but this time use a stopwatch or timer. Your partner will try to start the stopwatch at the same time that you release the meterstick, and to the stop the stopwatch as soon as you catch them meterstick. Repeat this process until you have completed five trials. Record all times in the second data table. You do not need to measure or record distance for these time trials.

Time Data	
Trial	**Time (s)**
11	
12	
13	
14	
15	
Average Time (s)	

Analysis

Find the average time by adding all five trials together and dividing that answer by five. Record the average reaction time in the data table in seconds.

Conclusions

1. How does your reaction time calculated from distance compare to the reaction time calculated using the stopwatch? Should these values be the same?

2. How does your reaction time compare with the other s in your group: are you faster or slower? Enter the Average distance and reaction time from a total of five people in the table below.

Name	Distance	Time

3. As the reaction time gets longer, the distance that the meterstick falls gets longer. Does the distance that the meterstick falls increase the same amount for each tenth of a second slower or does it change?